

[JP,06-159018,A(1994)]

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Notes:

1. Untranslatable words are replaced with asterisks (***).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 03/12/2010 / Priority: 1. Manufacturing/Quality / 2. Automobile / 3. Mechanical engineering

FULL CONTENTS

[Claim(s)]

[Claim 1] A base end which becomes focusing on tilting of a rocker arm, and a tip part which presses a valve stem, A process of carrying out forge processing of an intermediate part continuous between a base end and a tip part, and a pair of flanks which follow a method of both sides of an intermediate part from a material at the shape of a necessary extensive form, A process of carrying out stamping of the edge part of a pair of said flanks to a necessary peripheral shape, A process which carries out bending and is made into each-side-walls part of a rocker arm so that said a pair of flanks may be stood up, A manufacturing method of a rocker arm with a roller including a process of carrying out stamping of said intermediate part, and forming a through hole, and a process of arranging a roller which receives press of a cam between said each-side-walls parts and in a through hole, and attaching this roller pivotally rotatably in each-side-walls part.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacturing method of a swing arm type rocker arm with a roller especially about the rocker arm used for the valve gear of an internal-combustion engine.

[0002]

[Description of the Prior Art] The rocker arm with a roller which receives press of a cam with a roller came to be adopted as the latest valve gear, and the improvement in fuel consumption and the reduction of noise by fricative reduction were attained. Most of these rocker arms with a roller are casting or forge types as shown in drawing 11 and drawing 12. After the rocker arm 51 with a roller of the figure fabricates the main part 52 with casting or a forge, it cuts the attaching hole 53 of a deep large flat-surface quadrangle, and other each part, and manufactures them by the method of arranging the roller 54 on this attaching hole 53, and attaching pivotally rotatably.

[0003] However, in the above-mentioned manufacturing method, since especially metal cutting of the attaching hole 53 was difficult, the process of metal cutting had become very large what has an expensive manufacturing cost. Since there were many cutting parts, working shape was limited and the optimal design for a weight saving was difficult.

In a forge type, when the fiber flow at the time of the forge of a material cuts the deep large attaching hole 53, in order to go out, there was also a problem that the intensity at the time of a forge was unmaintainable.

[0004]Then, although the rocker arm 55 of the sheet-metal model-of-a-ship type which does not need metal cutting as shown in drawing 13 and drawing 14 was also devised, there was a problem that the fork part which faces across the outer-periphery-of-end side of a thread part or a valve stem which screws the pivot shaft which is not illustrated could not be fabricated.

[0005]Although these people proposed the sheet-metal bending type rocker arm 56 with a roller as [shown in drawing 15 and drawing 16] previously (JP,S63-272903,A), Since the board thickness of the sheet metal was constant, thickness of each part could not be changed freely, and since it was welding structure, there was a problem of being hard to carry out a compact design.

[0006]Since above-mentioned SUBJECT is solved, cutting parts decrease in number and the flexibility of a design of working shape becomes high, the optimal design for a weight saving becomes easy, and the purpose of this invention can be manufactured inexpensive, and there is in providing the manufacturing method of the rocker arm with a roller which can obtain still higher intensity.

[0007]

[Means for solving problem][to achieve the above objects the manufacturing method of the rocker arm with a roller of this invention] The base end which becomes focusing on tilting of a rocker arm, and the tip part which presses a valve stem, The process of carrying out forge processing of an intermediate part continuous between a base end and a tip part, and a pair of flanks which follow the method of both sides of an intermediate part from a material at the shape of a necessary extensive form, The process of carrying out stamping of the edge part of a pair of said flanks to a necessary peripheral shape, The process which carries out bending and is made into each-side-walls part of a rocker arm so that said a pair of flanks may be stood up, the process of carrying out stamping of said intermediate part, and forming a through hole, and the process of arranging the roller which receives press of a cam between said each-side-walls parts and in a through hole, and attaching this roller pivotally rotatably in each-side-walls part are included.

[0008]In the first forge processing process, forge processing of the surface-of-a-sphere crevice to which a pivot contacts a base end, for example can be carried out, or forge processing of the fork part which inserts into a tip part the putt surface which contacts the end face of a valve stem, and the outer-periphery-of-end side of a valve stem, for example can be carried out.

[0009]

[Function]The space which arranges a roller can be formed by bending of a flank, and stamping of an intermediate part, and it can be managed even if it does not cut an attaching hole like the conventional forge type. For this reason, since cutting parts decrease in number and the flexibility of a design of working shape becomes high, the optimal design for a weight saving becomes easy. Since the through hole by stamping of an intermediate part is shallow compared with the conventional deep large attaching hole, the fiber flow at the time of the forge of a material is connected without going out not much, and can maintain the intensity at the time of a forge.

[0010]

[Working example] Hereafter, the embodiment which materialized this invention is described with reference to drawing 1 - drawing 10. As shown in drawing 1 - drawing 3, the rocker arm 1 with a roller manufactured by the method of this example comprises the main part 2 and the roller 3. It comes to form the main part 2 in [a pair of side wall parts 7 which stood up in the method of both sides of the through hole 6 of the flat-surface quadrangle provided between the base end 4 which becomes focusing on tilting of a rocker arm, the tip part 5 which presses the valve stem 21, and the base end 4 and the tip part 5, and the base end 4, the tip part 5 and the through hole 6] one.

[0011] The surface-of-a-sphere crevice 8 which the spherical head portion 23 of the pivot shaft 22 inserts is formed in the undersurface of the base end 4. A pair of fork parts 10 which face across the putt surface 9 which contacts the end face of the valve stem 21, and the outer-periphery-of-end side of the valve stem 21 are formed in the undersurface of the tip part 5. The roller 3 which receives press of the cam 24 is arranged between each-side-walls parts 7 and on the through hole 6, and this roller 3 is rotatably attached pivotally by the bearing 12 to the pivot 11 which each-side-walls part 7 let pass.

[0012] The rocker arm 1 with this roller is manufactured through the following processes.
** The heavy-gage base end 4 provided with the surface-of-a-sphere crevice 8 from the material 15 of circular or an ellipse form (little useless shape is preferred.) which consists of sheet steel as shown in drawing 4 and drawing 5, The intermediate part 16 of a flat-surface quadrangle dented a little below succeeding between the heavy-gage tip part 5 provided with the putt surface 9 and the fork part 10, and the base ends 4 and the tip parts 5, Cold forging processing of the flank 17 of a pair of thin meat which follows the method of both sides of the base end 4, the tip part 5, and the intermediate part 16 is carried out at the shape of an extensive form which has abbreviated-maintained the even state of the material 15.

[0013] ** As shown in drawing 6 and drawing 7, carry out stamping of the edge part of a pair of flanks 17, and the unnecessary portion of a material to a necessary peripheral shape (the shape of mountain shape [The figure]).

** As shown in drawing 8 and drawing 9, carry out bending and consider it as each-side-walls part 7 of a rocker arm so that a pair of flanks 17 may be stood up.

** As shown in drawing 10, carry out stamping of the intermediate part 16, and form the through hole 6.

** As shown in drawing 1 - drawing 3, arrange the roller 3 between each-side-walls parts 7 and on the through hole 6, and attach this roller 3 pivotally rotatably by the pivot 11 and the bearing 12.

[0014] The space which arranges the roller 3 can be formed by bending of the flank 17, and stamping of the intermediate part 16, and it can be managed with this example even if it does not cut an attaching hole like the conventional forge type. For this reason, since cutting parts decrease in number and the flexibility of a design of working shape becomes high, the optimal design for a weight saving becomes easy. Since the through hole 6 by stamping of the intermediate part 16 is shallow compared with the conventional deep large attaching hole, the fiber flow at the time of the forge of the material 15 is connected without going out not much, and can maintain the intensity at the time of a forge.

[0015] This invention is not limited to the composition of said embodiment, and can also be changed and materialized as follows, for example in the range which does not deviate from the meaning of an invention.

(1) As a material of forge processing, the thing of shape and construction material various besides the sheet steel can be used, for example, it can also be made from a round-bar cut piece by *****.

(2) The next processing may be added after forming the through hole 6 by stamping.

** In the boundary part of the inner surface of the through hole 6 formed by stamping, and the inner surface of the side wall part 7, it is easy to produce some stage. Then, it is preferred to iron this boundary part, for example and to remove the stage.

** Stamping may make the circumference produce some distortion. Then, it is preferred to carry out the coining process of the surface-of-a-sphere crevice 8, the putt surface 9, and the fork part 10 grade, for example, and to raise the accuracy.

[0016]

[Effect of the Invention] Since according to the manufacturing method of the rocker arm with a roller of this invention cutting parts decrease in number and the flexibility of a design of working shape becomes high as explained in full detail above, the optimal design for a weight saving becomes easy, and it can manufacture inexpensive, and the outstanding effect which can obtain still higher intensity is generated.

[Brief Description of the Drawings]

[Drawing 1] The rocker arm with a roller of the embodiment which materialized this invention is shown, and it is an I-I line sectional view of drawing 2.

[Drawing 2] It is a top view of the rocker arm.

[Drawing 3] It is a left side view of the rocker arm.

[Drawing 4] It is a top view after forge processing of a material.

[Drawing 5] It is a V-V line sectional view of drawing 4.

[Drawing 6] It is a top view after stamping of a material.

[Drawing 7] It is a VII-VII line sectional view of drawing 6.

[Drawing 8] It is a top view after bending about the side wall part of a material.

[Drawing 9] It is an IX-IX line sectional view of drawing 8.

[Drawing 10] It is a sectional view after stamping about the intermediate part of a material.

[Drawing 11] It is a front view of a rocker arm with a roller the conventional casting or forge type.

[Drawing 12] It is a top view of the ROKKAMU.

[Drawing 13] It is a front view of a rocker arm conventional sheet-metal model-of-a-ship type.

[Drawing 14] It is a top view of the ROKKAMU.

[Drawing 15] It is a front view of a rocker arm with a roller conventional sheet-metal bending type.

[Drawing 16] It is a top view of the ROKKAMU.

[Explanations of letters or numerals]

1 Rocker arm 2 with roller Main part

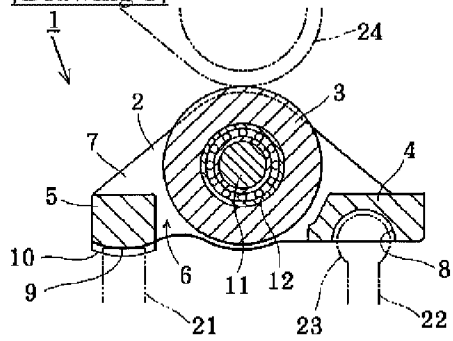
3 Roller 4 Base end

5 Tip part 6 through hole

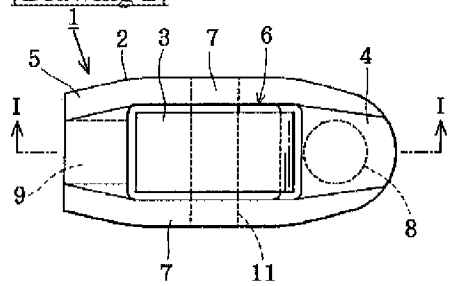
7 Side wall part 15 material

16 Intermediate part 17 flank
 21 Valve stem 24 Cam

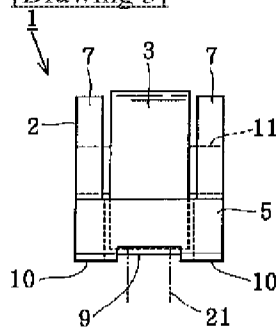
[Drawing 1]



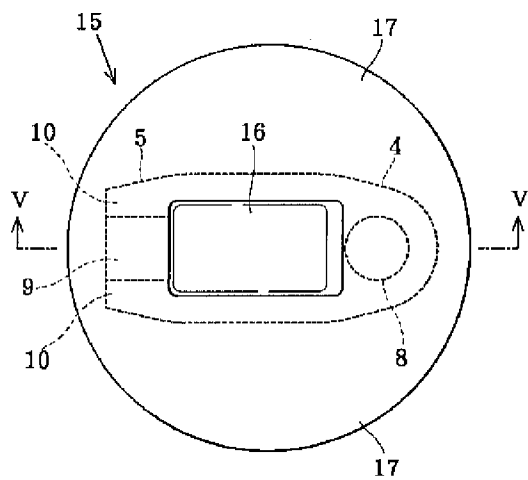
[Drawing 2]



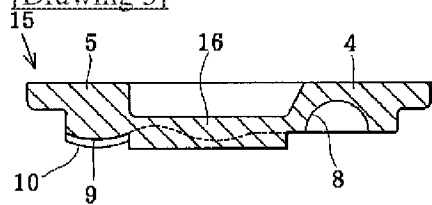
[Drawing 3]



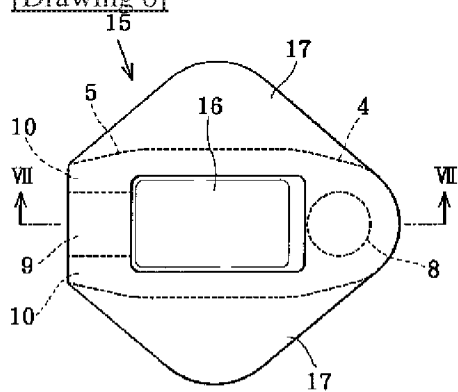
[Drawing 4]



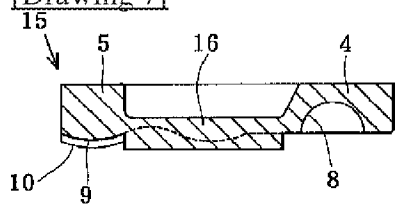
[Drawing 5]



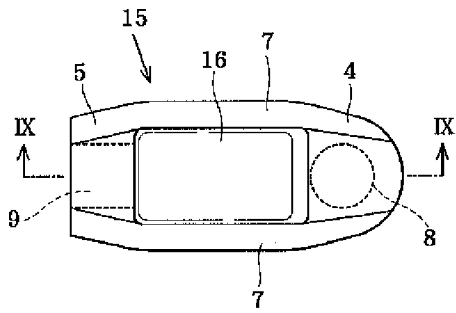
[Drawing 6]



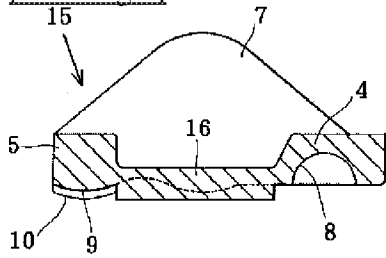
[Drawing 7]



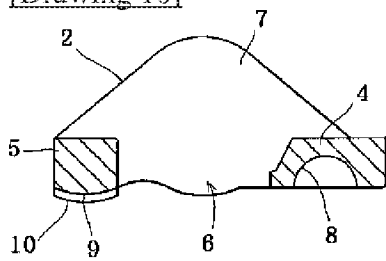
[Drawing 8]



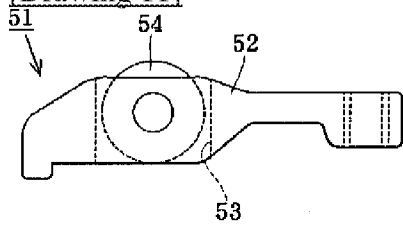
[Drawing 9]



[Drawing 10]



[Drawing 11]



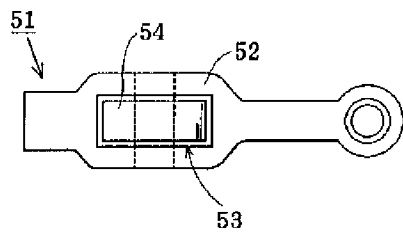
[Drawing 13]



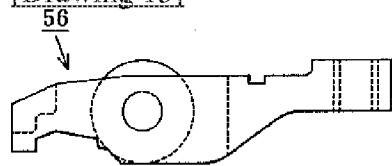
[Drawing 14]



[Drawing 12]



[Drawing 15]



[Drawing 16]

